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AN EVALUATION OF TWO HAZING METHODS FOR URBAN CANADA GEESE

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The Hi-Line population of Canada geese (*Branta canadensis*) that winters east of the Continental Divide has increased substantially in recent years (Szymczak 1975.) This increase has been accompanied by the development of resident urban populations of geese that are augmented during the winter months by migratory birds. Conflicts between geese and people have been reported and, at present, effective goose control methods have not been developed (e.g., Conover 1989).

The most common techniques to reduce use of areas by geese include loud noises (e.g., firecrackers and exploders), chasing, harassing with dogs, swan decoys, wires or lines to discourage geese from ponds, and shooting (Conover and Chasko 1985). Of these methods, at least 2 appear to be applicable to urban situations. First, loud noises, such as those created by screamer shells, cause geese to fly. Second, tapes of geese alarm or distress calls may also cause geese to abandon an area (Mott and Timbrook 1988). Although these methods may be appropriate in urban areas, their usefulness has not been tested. Hence, in this study, we evaluated the effectiveness of goose calls and screamer shells to disperse wintering Canada geese in Fort Collins, Colorado.

METHODS

We conducted the study at 10 parks and recreation areas within Fort Collins, Colorado between November 1988 and February 1989. Sites were separated by at least 4 km, ranged from 0.6 to 1.0 ha in size, and 6 of 10 were associated with ponds. City government had received complaints about Canada geese from landowners for each site, although no form of goose harassment had been conducted at any of the sites prior to our study.

We randomly assigned a treatment of either goose calls or "screamer" shells to each site, creating 5 replications of each treatment. One replication of each treatment was conducted during December, and 4 replications of each treatment were conducted during January and February.

Two goose-call tapes were used. The first contained the alarm call of 1 goose and a chorus of 25 disturbed geese as they took flight (Mott and Timbrook 1988). The second tape contained the distress call of a single

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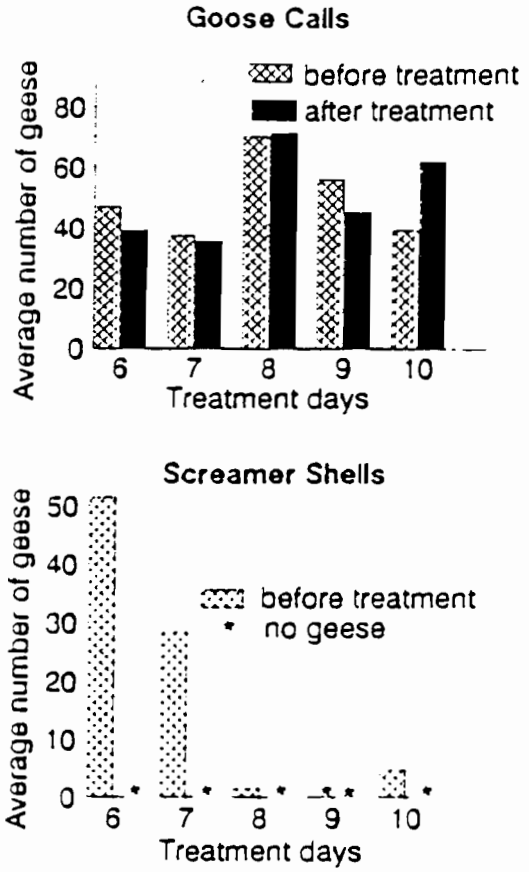

Fig. 1. Average number of Canada geese using sites immediately before and after the taped goose-call treatments and the screamer-shell treatments (short-term effects), Fort Collins, Colorado, November 1988 to February 1989.

goose. The first tape was used for the first 3 replications while the second tape was used for the last 2 replications. We used an electronic audio system (PA50, Applied Electronics Corporation) to broadcast the goose calls. This unit was connected to 4 speakers (30 watts/speaker) mounted on a car-top carrier. The car was parked 25 to 40 m from the edge of goose flocks with the speakers oriented toward the geese. The tape was played for 10 minutes. The car was covered with black plastic in half of the treatment applications to minimize geese associating our vehicle with the goose calls.

We used a 6-shot pistol (Record PTB 167) to fire the screamer shells (Piro-Pfeifpatronen P, Marshal Hyde Corp.) from a distance of 25 to 40 m from flocks of geese. Screamer shells were fired during a 10-minute period or until geese left the site.

Each replication consisted of 3 periods: pretreatment, treatment, and post-treatment. The first 2 periods lasted 5 days while the third period varied with the time it took geese to reoccupy the sites. During the pretreatment, treatment, and post-treatment periods each site was visited once in the morning and once in the afternoon. Treatments were applied for 5 consecutive days. During this period the number of geese were counted once before the treatment application and 3 times at 10-minute intervals after the application. For each replication, geese were counted and the treatments were applied at randomly chosen morning (0900, 1000, 1100, and 1200) and afternoon (1300, 1400, 1500 and 1600) times.

We evaluated the effectiveness of each treatment by its short- and long-term effects. For the short-term effect we compared: a) for taped goose calls, the number of geese at the site immediately before and after the treatment, using a repeated measures Analysis of Variance (PROC GLM, SAS Inst. Inc. 1987), b) for screamer shells, the average number of geese before and after each treatment, using the means of the 3 counts following treatment observations, and c) for both, the proportional reduction of geese following the treatment application when compared with the number of geese before the treatment application.

For the long-term effect we: a) determined how long it took geese to reoccupy a site once the treatment had ceased, b) compared the average number of geese during the pretreatment versus the average number of geese during the post-treatment periods, and c) determined the reduction of geese in the 5 days following cessation of the treatment. To analyze goose reduction, we compared the average number of geese during the pretreatment (5 days, 5 replications) with the average number of geese during the post-treatment (5 days, 5 replications), and the proportional reduction in the number of geese between both periods. Differences between means and proportions were examined using a *t*-test (PROC GLM, SAS Inst. Inc. 1987).

RESULTS

Goose Calls

Because there were no differences in goose response ($P = 0.80$) or proportional goose reduction ($P = 0.31$) between the 2 tapes, we pooled and analyzed the data together. Goose flocks (pretreatment flock size: $\bar{x} = 55.4$, SD = 73.0, $n = 25$) responded to the taped goose calls by becoming alert and sometimes moving up to 100 m away. In sites with small ponds the geese moved to the water or to the opposite side of the ponds. In all cases geese resumed feeding within 2–3 minutes after the tape began playing. During the treatment and the ensuing 30 minutes, 2 to 3 geese flew away from a site while other geese flew to a site; however, flocks never left a site.

There were no short-term differences in the number of geese before and after the goose-call application in any of the 5 treatment days

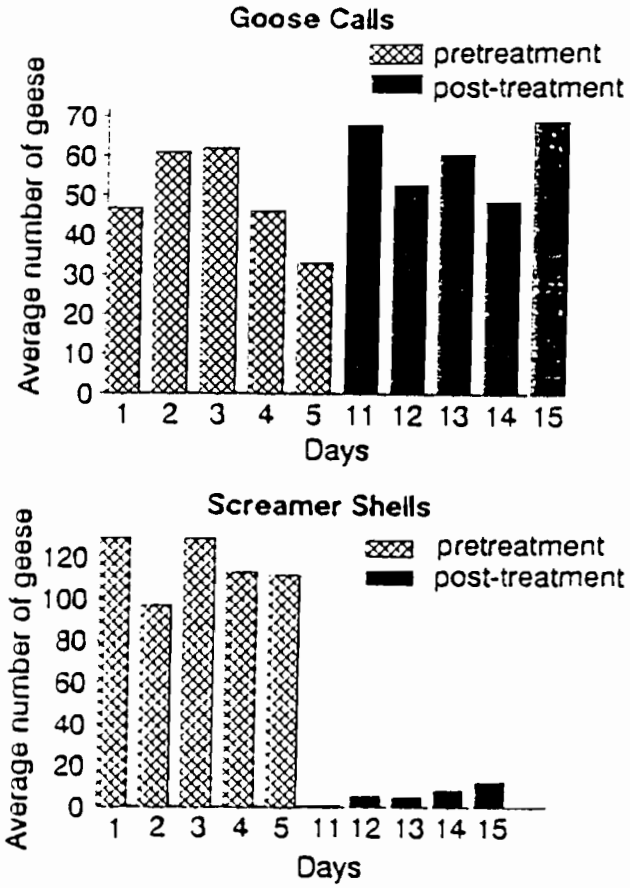

Fig. 2. Average number of Canada geese using areas during the 5-day pretreatment and the 5-day post-treatment periods for the taped goose-call treatments and the screamer-shell treatments (long-term effects), Fort Collins, Colorado, November 1988 to February 1989.

(day 6: $P = 0.56$; day 7: $P = 0.94$; day 8: $P = 0.84$; day 9: $P = 0.78$; and day 10: $P = 0.57$), or in the average number of geese before and after the treatment application when the data from the 5 replications were pooled ($P = 0.659$) (Fig. 1). There were no day effects (Wilks' Lambda: $P = 0.612$), and no interactions between day and number of geese before and after treatment application (Wilks' Lambda: $P = 0.98$), although there was, on average, a 7.5% proportional goose reduction.

We also found no long-term response to the taped goose calls ($P = 0.57$). In fact, there was a 9.9% increase in the average number of geese during the post-treatment period (Fig. 2).

Screamer Shells

Goose flocks (pretreatment flock size: $\bar{x} = 127.7$, SD = 177.9, $n = 25$) always flew away from a site following the application of screamer shells. On average, 2.7 shots (SD = 2.2, range: 1–12) were fired before goose flocks left the study sites. There was a significant ($P < 0.001$) short-term response to the screamer shells (Fig. 1), and a 100% reduction of geese using a site immediately following the application of screamer shells.

There was also a significant ($P < 0.001$) long-term effect in use of sites following application of screamer shells (Fig. 2). In 3 of the 5 replications there were no geese present up to 15 days after the treatment was stopped. In the 2 other replications geese gradually reoccupied the areas on the third and sixth day, respectively, following the cessation of treatments. On average, there was an 88.8% reduction in geese using an area in the 5 days following the treatment.

DISCUSSION

The general reaction of geese to our taped goose calls was to become alert, but flocks never left an area. Mott and Timbrook (1988), using 1 of the tapes we used, found a 71% reduction in geese using an area following playing of the tape and a 96% reduction in goose numbers when the tape was applied in combination with racket bombs (i.e., noise makers). A difference between our work and Mott and Timbrook's was that they played the tape while driving their vehicle towards the geese. Additionally, their criterion to evaluate goose reduction was the movement of geese >100 m from their car, whereas our criteria were more stringent.

Although use of screamer shells has declined since the development of automatic acetylene exploders, they are still a popular method to scare blackbirds and waterfowl from agricultural areas (Meanley 1971, Dolbeer 1980, Knittle and Porter 1988). The disadvantages of us-

ing screamer shells are the need for an operator to apply the shells, disturbance to people, and birds habituating to the noise (Knittle and Porter 1988). The use of screamer shells in our study would require an operator for approximately 5 minutes, twice a day. Although we fired screamer shells twice daily, there were no complaints from urban residents. Finally, we found no evidence of geese habituating to the screamer shells because all geese departed after each treatment, there was a significant reduction in geese 3 days post-treatment for all replications, and there were no geese up to 15 days after the treatment was stopped in 3 of 5 replications.

Schultz et al.(1988) found that resident geese showed strong site fidelity to feeding and roosting areas. Perhaps this behavior, and hunting pressure which migratory geese are subjected to, cause geese to remain sensitive to the screamer shells and not habituate. The 2 replications in our study where geese began to reoccupy areas were located close to sites which had daily concentrations of 150 to 1,500 geese. As geese were scared away from these 2 sites, possibly naive flocks of geese would arrive from the loafing areas nearby. Although screamer shells resulted in both a short and long effect, there are situations where reinforcement of the treatment with another scare technique would be required.

Finally, we have not addressed the larger issue of managing geese at the spatial level of an entire city. Although the screamer-shell method was effective in deterring goose usage of a particular site, we suspect geese which learned to avoid 1 site simply redistributed to other areas within Fort Collins. In this context, an urban goose problem might be solved at 1 spatial level (e.g., a city park) but still exist at a larger level (e.g., a city). The information we present here is only 1 ingredient necessary to formulate a comprehensive management scheme for urban geese.

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